with the nearness of the land, so that here the temperature of the sea rises with its depth, and the axis of warmth of the Gulf Stream is moved away from the coast towards the open sea. Taking the form of the Gulf Stream as that of its surfaces having the same temperature—isothermal surfaces—we can compare it with the shape of one of the small boats called prams, which are broadest at the stern, deeper in the centre than behind, and possessing a somewhat rounded stem. The stern of this Gulf Stream pram is formed by a vertical section from Iceland to Scotland; the longitudinal section forms the axis of warmth, running along the coast of Norway. The side nearest the Polar Ocean (the larboard side) is much more considerable than the starboard side, which leans against the Norwegian coast. In summer the starboard side is pushed quite close to the Norwegian coast, and hangs strongly over, while the larboard side is perpendicular, or only slightly inclined outward; the keel near Spitzbergen sitting deep in the water. In winter the starboard side is thirty (geog.) miles broad, and has in the parts lying nearest to the coast sides strongly inclining inward, while the strata in the centre and those bordering on the Polar Ocean rise nearly perpendicularly, the keel in the fore part raising itself almost into the position of the stem, which ends in the same point as that formed by the isotherms of the surface at this season. Generally this aspect is only presented by the part of the sea which lies westward from Norway and partly from Spitzbergen.

The warm waters of the Novaja Semlja Sea are like a wedge placed horizontally, with its base between Spitzbergen and Norway, and its horizontal sharp edge turned towards the north and east.

THE ROYAL SOCIETY OF VICTORIA

WE are glad to notice the progress of Science in Victoria as exhibited by the address of the President, Mr. Ellery, on the occasion of the annual *conversazione* held on July 8. We reprint the following extracts from the *Argus* of the following day:—

"We have now entered upon our fifteenth session, and as you have done me the great honour to again choose me as your President, it devolves on me, in accordance with our rules, to address you on the past year's history and progress of the Society; and also to call your attention to some of the more noteworthy facts which mark the last year's history of general scientific progress. First, then, in reference to our own business, I regret to have once more to inform you that, since the last publication of the *Transactions* of the Society, the funds have not been in a sufficiently flourishing condition to enable the council to resume the printing. For many years past the only revenue of the Society has been that derived from entrance fees and subscriptions of members. From this not only the current expenses but the interest on money borrowed for carrying out the alterations and additions to our buildings has to be paid; and although our income will amply meet these demands if the annual subscriptions of members are regularly paid, there has hitherto been an insufficient sum left to print our *Transactions* without other aid. The Government have been solicited for help every year since 1867, when the last aid was granted to us by Parliament. The council hope, however, that this year their request will be acceded to. I am happy to state, moreover, that (many arrears of subscriptions having been received of late) the financial condition of the Society is just now better than it has been for years. It is intended, therefore, at all events to at once print the *Transactions*, and the council trust that they may be able henceforward to publish promptly and regularly the proceedings of our meetings, which they will be quite able to do if the Parliament resumes its small annual grant-in-aid. Our last anniversary meeting was held on August 14, 1871. Since that time the Society has held eight ordinary meetings. On September 11 a valuable paper 'On Ocean Waves and their Action on Floating Bodies,' was contributed by Mr. Deverill. Mr. Macgeorge also read a paper, contributed by Mr. Horne, of Adelaide, 'On a Linear Method of Finding the Stability of Ships;' and Mr. Pain, on 'Aboriginal Art and its Decadence in Australasia, Polynesia, and Oceanica.' The meeting of October 9 was occupied with Mr. Macgeorge's account of 'Changes in η Argus,' and Mr. G. Foord's 'Aërometer for Measuring Specific Gravities.' On November 13, our next meeting, the Rev. W. Kelly and Mr. Bosisto contributed papers, the former on 'On a Method of Combining Marsh's Test for Arsenic with Reinche's, so as to secure very reliable results;' the latter 'On the Cultivation of *Mentha piperita* in Victoria.' On November 22 it will be remembered the Australian Eclipse Expedition started from Melbourne. Our next meeting was a special one held on January 22, and was devoted to matters connected with the Eclipse Expedition, and to the approaching elections of council and office-bearers, which took place on our next meeting, on March 11. In April Mr. Harrison read a paper 'On Patents and their Utilisation.' Mr. Caldwell contributed one on 'Meat-preserving,' and Mr. P. F. Foord 'On Bi-angular Co-ordinates.' On May 13, Mr. F. Poolman read a description of his 'Self-Acting Safety Regulator and Coal Economiser for Steam Engines,' and Mr. A. K. Smith exhibited and described 'An Improved Valve for the Fire Plugs in Water Pipes,' the object being to prevent the entry of sewage water into the pipes when the pressure was off—a thing that might occur with the ordinary fire-plug valves. At our last meeting, on June 10, Mr. Macgeorge contributed the 'Results of Observations on Sirius and its Companions' with the great Melbourne telescope. Mr. White exhibited some new five-figure card logarithms which he had arranged, and Mr. Gibbons read a few 'Notes on M. Berthelot's Analysis of the Cranbourne Meteorite.'"

After alluding to the reports received from the Austra-Expedition for observing the total eclipse of Dec. 12, with which our readers are already acquainted, the President continued:—

"I have but little of more than ordinary interest to record of the past year's history of our several science or art institutions. The Technological Museum attached to the Public Library has made considerable progress; not only have the Commissioners established classes of chemistry, mineralogy, and practical mining, but have organised evening courses of lectures on popularised science and art. These have always been so well attended that it is to be regretted that a larger lecture-room than the one which was built for class teaching has not been erected. The earlier courses of these lectures have been printed and circulated by the Commissioners. They appear to have attracted considerable attention in England and on the Continent, especially those by Baron von Mueller on Forest Culture, and the purely technological series of Mr. George Foord. Prof. Negri, president of the Royal Geographical Society of Italy, in referring to Baron von Mueller's lecture, said he wished the Italian Government would have it translated into Italian and circulated throughout the country. A telegraph class for ladies has also been established in connection with the museum, at which pupils are instructed in the manipulation and ordinary use of the Morse telegraph instruments. It is intended, I believe, to hold periodic examinations of the pupils, and to grant certificates to such as prove themselves to be competent. The most recent step in the right direction the Commissioners have taken is the appointment of a gentleman of undoubted ability to conduct classes in geometry and mathematics. The additions that have been made from time to time to our national gallery of pictures now form a most valuable and beautiful collection, and it seems well adapted to fulfil one of its principal objects—the foundation of a school of painting. Already we have seen in Melbourne copies after pictures in our national collection of no small merit, and giving good promises of future excellence. For so young a colony as ours the number of students is even now large, and is, I hear, increasing. The National Museum at the University, under the care of Prof. M'Coy, is becoming more complete and perfect every year; the space that has become available, through the removal of many of the mining and machinery models to the Technological Museum will be most advantageously bestowed upon numerous beautiful specimens and collections which hitherto have appeared somewhat too crowded. Botanical science in the colony, represented by our fellow member, Baron von Mueller, has made considerable progress during the past year. I have already referred to his lectures on forest culture, in which he clearly set forth the more important and lasting objects of a botanical department in a new country, and, to quote his own words, 'A botanic garden has not merely to gratify the passing hour, but has to fulfil great objects of the whole community, as well for this as for the coming generation.' Baron von Mueller, I am glad to say, intends shortly to issue some popular works on Australian botany; the first, I believe, is to be devoted to the ferns, and it is intended to illustrate it by photo-lithography. I have been also informed that Count Castelneau, the well-known zoologist, has prepared a descriptive essay on the fishes of Victoria, which is to be issued with the report of the Acclimatisation Society. I refer to these points, although they do not belong to our past year's history, because they indicate scientific vitality and progress; and although the fruition may belong to another year of this Society, the work evidently belongs to this. In our Observatory one of the most interesting results of the past year's work is the establishment of the fact that the nebula in η Argus has not only undergone marked change since the time it was observed and drawn by the late Sir John Herschel at the Cape of Good Hope, but has also exhibited notable change since the erection of the great telescope in Melbourne. Drawings of it made at intervals of only a few months, as was pointed out by Mr. Macgeorge in the paper he read before you at our October meeting, present such differences that we can now hardly escape from the impression that observable changes in this nebula take place very rapidly. Several observers in the southern hemisphere have devoted a good deal of attention and observation to this celestial object—notably, Mr. F. Abbott, of Hobart Town; Mr. H. C. Russell, director of the Sydney Observatory; Mr. Tebbutt, of Windsor, New South Wales; and Lieut. Herschel, in India. Mr. Abbott, I believe, was the first to draw attention to the fact that it no longer appeared as drawn by Sir John Herschel. Mr. Russell made a very careful drawing of the nebula as seen with the Sydney 7¼-in. refractor. Mr. Abbott also made some drawings from observations from a 4½-in. refractor, and Lieut. Herschel by the aid of a 12-in. reflector. They have all indicated that the general appearance of the nebulæ differed considerably from that represented by Sir John Herschel's drawings, although none of the apertures used could in any way pretend to reach the more minute details grasped by Herschel's 2-ft. reflector. Several of the drawings which reached home had evidently not been executed with that precision which is so necessary to establish a fact of this kind in the minds of astronomers who are unable to see for themselves. There has arisen, therefore, in the minds of many of our most renowned observers in England and elsewhere, doubts as to the real existence of these changes. For it must be remembered that the immense distance of the nebulæ from us—probably far beyond the most distant stars—makes it necessary that changes such as these described, to be visible to us even with the aid of such light-gathering apertures and optical power as is possessed by our large telescope, must be stupendous in the highest degree, and almost beyond comparison with the most ordinary cosmical changes with which we are familiar. Now, since the great telescope has been erected, special attention has been given to this object. Mr. Le Sueur devoted a great deal of time, extending over long periods, to examination and drawings, repeating his observations again after the lapse of many months. He constantly referred to me to establish or throw doubt on his observations, so that I often observed with an unbiassed eye for this purpose. The stars down to the 16th magnitude were carefully plotted (those to the 12th magnitude with the micrometer), to form an unchanging groundwork for the mapping. He announced on several occasions in this society and elsewhere that there were unmistakable changes since Sir John Herschel's drawings. Mr. Macgeorge, who succeeded Mr. Le Sueur, and who has also observed and drawn the nebulæ constantly, pointed out to you in his paper in October last the progressive changes that had been noted. The diagram he then exhibited I had photographed and sent home to Dr. Robinson (one of the Great Telescope Committee), with a copy of Mr. Macgeorge's paper. The paper got home first, and Dr. Robinson says, in a letter I received last mail: 'I lose no time in forwarding the paper to Sir E. Sabine, Mr. Lassell, and Mr. Warren De La Rue. . . . . . Mr. Lassell seems to cling to the idea which he published some time ago, that there was no change whatever in η Argus. He justifies this suspense of opinion by not being able to refer to the drawings, a difficulty which I hope you will soon be able to remove. I think his real difficulty is an opinion that nebulæ must be at a distance much greater than that even of small stars, and hence an incapability of conceiving the possibility of such changes as could be visible to us.' The photographs reached him by next mail, and he then writes:—'The photographs are very remarkable, and I think it is impossible to look at them and doubt the reality of the immense changes that have taken place. Are these changes periodical? I send one of the photographs by this post to Sir Edward Sabine, with request to forward it to Messrs. Lassell and De La Rue.' It is to be regretted that the minute and careful drawings made by Messrs. Le Sueur and Macgeorge have not yet been engraved, as they establish the facts beyond all doubt, as the photographs sent home were from a somewhat rough diagram intended only to show the principal features of the observed changes. No one accustomed to observing could fail to be convinced of change going on, if he only saw the nebulæ with a power of six or seven hundred on the great telescope on good nights at at intervals of three or four months. Mr. Macgeorge reports from observations made only two months since that still further changes were evident. The full significance of these changes can hardly yet be estimated; but they overthrow many of our hitherto-received notions of the condition of these tenants of space. It is a subject of the highest interest in physical astronomy, and one that will demand unremitting observation and drawing for its further elucidation. I am glad to inform you that the Government has given me authority to publish every month the results of our observations in meteorology, terrestrial magnetism, and of other phenomena; the numbers from the commencement of the year till the end of May are already before the public. By this means all the useful information derivable from the Observatory work in these branches of investigation is made quickly and generally available. Photography of celestial objects has been commenced with the great telescope, and some exceedingly fine and promising negatives of the moon were taken, enlargements from which have already been exhibited at one of our meetings. Since April the weather has been too unfavourable to proceed with this work. Attempts to obtain photographs of planets and nebulæ have since been made; but while those of the planets promise well, no impression whatever of the brightest nebulæ could be secured. Among the many subjects which have occupied a large share of the attention of scientific circles in the older world, and which mark indelibly the progress of scientific research during the past year, there is one which appears to me of surpassing imporance. The Royal Astronomical Society awarded its gold medal this year to Prof. Schiaparelli, director of the Observatory at Milan, principally on account of his researches on the relations that exist between comets and shooting stars. You will remember in a former address I had the honour of delivering to you, I spoke of the 'meteor shower' which fell in Europe in November 186—, and that it had been established beyond a doubt that these bodies travelled in orbits intersecting that of the earth at different points; that one coterie intersected it in November, another in August, and so forth. Since then, however, it has been found from observation that the number of these meteor rings is very large, and that they intersect the earth's orbit at numerous points. And it may be stated generally, that all falling or shooting stars, at the time we see them, are, or have been very recently, members of groups travelling in true orbits, and not merely stray wanderers in space. Prof. Schiaparelli has concluded from his researches that 'celestial matter may be divided into the following classes:—1. Fixed stars. 2. Agglomeration of small stars (resolvable nebulæ). 3. Similar bodies, invisible except when approaching the sun (comets). 4. Small particles, composing a cosmical cloud.' He thinks the last occupy a large portion of space, and have motions similar to fixed stars. The latter are the sources of falling stars. Brought by the motion of our system in space within the sphere of our sun's attraction, they become in a measure part of his family and subject to him. If, while making their sun journey, they approach a planet—the earth for instance—they get disturbed in their orbits, and, becoming subject to the earth's mass, liable to enter the upper regions of our atmosphere, under which condition they appear to us as 'shooting stars.' 'Thus meteors and other celestial phenomena of like nature, which a century ago were regarded as atmospheric phenomena—which La Place and Olbers ventured to think came from the moon, and which were afterwards raised to the dignity of being members of the planetary system—are now proved to belong to the stellar regions, and to be in truth falling stars. They have the same relation to comets as the asteroids have to the planets; in both cases their small size is made up by their greater number. Lastly, we may presume that it is certain that falling stars, meteors, and aerolites differ in size only and not in composition; therefore we may presume that they are an example of what the universe is composed of. As in them we find no elements foreign to those of the earth, we may infer the similarity of composition of all the universe—a fact already suggested by the revelations of the spectroscope.' Professor Schiaparelli had noticed a remarkable likeness between the elements of the orbits of some of these meteor groups to those of some well-known comets, the perihelion passage occurring approximately at near dates, the direction of their motion alike, the point they intersect the ecliptic, and their inclination to it very similar, while the distances of their nearest approach to the sun, and their period of revolution, have also a marked likeness. The relations are very remarkable, and Prof. Schiaparelli concludes one of his last memoirs on this subject in these words:—'These approximations need no comment. Must we regard these falling stars as swarms of small comets, or rather as the product of the dissolution of so many great comets? I dare make no reply to such a question.' The conclusions of Prof. Schiaparelli are of the highest interest, and suggest some new and interesting questions on the constitution of the universe. Are the irresolvable nebulæ systems of these cosmical particles? If so it will add a fresh interest to our observations of the changes going on in that of η Argus.

"In a new country, such as ours, in which all are so fully engaged in business pursuits, it would be unreasonable to expect so large an annual crop of scientific facts as are realised in the older countries; but as the fields for original observations in a new country are really wider in many respects than in the older, it is of course, of the first importance that what we do obtain should be properly recorded and disseminated. I have mentioned that the Society's *Transactions*, the printing of which has been too long suspended, will be immediately resumed, and I believe I may confidently state that the present prospects of the Society are such as to warrant the belief that they will henceforth appear with regularity. It should be remembered that although this Society has how existed for so many years, its ranks are still thin, wanting both workers and supporters. It has been recently proposed in your council, as a means of strengthening and increasing the utility of the Society, that a rule should be adopted to admit of residents at a distance joining us as country life-members, on the same scale as ordinary members are now admitted, by payment of half the usual subscription. This will entitle such members to the Society's publications, and to all the privileges of membership when in Melbourne. I have chosen the earliest occasion for announcing this proposition, which will no doubt be presently adopted by the generality of the members. I also wish to remove an impression which, I believe, holds some ground, that advanced scientific attainments are indispensable qualifications for membership. The object for which our Society is founded was the promotion of literature, science, and art in the colony. Whoever can assist in this is, so far, eligible for membership."

NOTES

MR. STANLEY has forwarded to the daily papers a letter from Zanzibar, dated July 22nd, stating that communications have been received from the interior, which render it probable that Dr. Livingstone would receive his stores and letters about August 1st. In that case he would leave Unyamyembe about August 10th, and be now near Mrera, in Central Ukonougo.

THE following letter has been sent by Lord Granville to Mr. H. M. Stanley, the special correspondent of the *New York Herald*, accompanied by a magnificent gold snuff-box richly set in brilliants:—"Foreign Office, Aug. 27, 1872.—Sir,—I have great satisfaction in conveying to you, by command of the Queen, Her Majesty's high appreciation of the prudence and zeal which you have displayed in opening a communication with Dr. Livingstone, and so relieving Her Majesty from the anxiety which, in common with her subjects, she had felt in regard to the fate of that distinguished traveller. The Queen desires me to express her thanks for the service you have thus rendered, together with Her Majesty's congratulations on your having so successfully carried out the mission which you so fearlessly undertook. Her Majesty also desires me to request your acceptance of the memorial which accompanies this letter."

ON Monday evening the "Livingstone Search and Relief Committee of the Royal Geographical Society" met to consider its final judgment upon the conduct of the expedition under Lieutenant Dawson, which left England on the 9th of last February, and arrived at Zanzibar on the 17th of March, some months after Dr. Livingstone had been found and relieved by Mr. Stanley. The Society, however, adjourned the inquiry, and have agreed to put their questions in writing, so that Lieutenant Dawson may give them a categorical answer. The blue book